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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/05/2000

Patrick F. Leonard

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12/29/2004

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EXAMINER

KAO, CHIH CHENG G

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 12/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/680,342

Applicant(s)

LEONARD ET AL.

Examiner

Chih-Cheng Glen Kao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 October 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>5/24/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Information Disclosure Statement

2. The information disclosure statement filed 5/24/04 fails to comply with 37 CFR 1.97(c) because it lacks a statement as specified in 37 CFR 1.97(e). It has been placed in the application file, but the information referred to therein has not been considered.

The information disclosure statement filed 5/24/04 also fails to comply with 37 CFR 1.97(c) because it lacks the fee set forth in 37 CFR 1.17(p). It has been placed in the application file, but the information referred to therein has not been considered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 27, 33, and 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim

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term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. The term “three dimensional image” in line 2 of claims 27, 33, and 40, is used by the claims to mean “three dimensional profile”, while the accepted meaning is an image giving the illusion of depth or varying distances. The term is indefinite because the specification does not clearly redefine the term. As seen on page 9, lines 12-26, the specification refers to “3D profiles”, which are profiles representative of altitude data as seen in Figure 6. However, these profiles are not three dimensional images as defined by its ordinary meaning. Thus, the claims are rejected as being indefinite. The Examiner has examined the claims as best understood as follows.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 17-19, 21, and 22, are rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. (Translation of EP 0471196) in view of Paulsen et al. (US Patent 6522777) and Haugan et al. (US Patent 6118538).

5. Regarding claim 17, Mengel et al. discloses a method comprising: acquiring a two dimensional image (claim 1, line 4) characteristic of a portion (page 3, line 15, “image features”), the two dimensional image defined by a plurality of locations having at least an

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address (page 3, line 11, “number of image features”, line 18, “location”, and last line, “raster”) and an intensity (page 3, line 15, “grayscale”), acquiring a three dimensional image characteristic (claim 1, line 1-2, page 4, line 29) of the portion (page 3, lines 16-18), defined by a plurality of locations having at least an address (page 3, line 11, “number of image features”, line 18, “location”, and last line, “raster”) and an altitude (col. 5, lines 58-60), processing the two dimensional image to identify a plurality of addresses which are characteristic of three dimensional features (page 3, lines 15-16), processing the three dimensional image only at those addresses which correspond to two dimensional addresses characteristic of three dimensional features (page 3, lines 16-18), to determine the altitude of those three dimensional features (page 4, line 33), and determining if the altitude of the three dimensional features fall outside predetermined boundaries (page 1, last 6 lines, page 2, line 31, page 5, line 6, and claim 1, line 2).

However, Mengel et al. does not specifically disclose two and three dimensional images defined by a plurality of pixels and rejecting an IC package.

Paulsen et al. teaches two and three dimensional images (col. 32, lines 65-67) defined by a plurality of pixels (col. 3, line 23). Haugan et al. teaches rejecting (col. 9, lines 16-21) an IC package (Fig. 8a, #22).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. with the images with pixels of Paulsen et al., since one would be motivated to make such a modification to increase resolution for better images (Fig. 21) as implied from Paulsen et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. with the rejecting of an IC package of Haugan et al., since one would be motivated to make such a modification to improve quality (col. 5, lines 1-5) as implied from Haugan et al.

6. Regarding claims 18 and 21 and for purposes of being concise, Mengel et al. as modified above suggests the method as recited above. Mengel et al. further discloses determining a shape (page 2, line 31).

However, Mengel et al. does not disclose rejecting if a shape or any feature falls outside a predetermined boundary.

Paulsen et al. further teaches rejecting (col. 2, lines 55-57, and col. 3, lines 1-2) if a shape or a feature (col. 6, line 65) falls outside a predetermined boundary.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further incorporate the method of Mengel et al. as modified above with the rejecting of Paulsen et al., since one would be motivated to make such a modification to better monitor quality of parts produced (Abstract, lines 1-2) as implied from Paulsen et al.

7. Regarding claim 19, Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not specifically disclose spheres.

Paulsen et al. further teaches spheres (col. 6, line 43).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further incorporate the method of Mengel et al. as modified above with

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the spheres of Paulsen et al., since one would be motivated to make such a modification to inspect BGA arrays (col. 6, line 43) for improving quality of the product and fixing manufacturing problems (Abstract, lines 1-6) as implied from Paulsen et al.

8. Regarding claim 22, Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not specifically disclose inspecting coplanarity.

Paulsen et al. further teaches inspecting coplanarity (col. 6, lines 43-47).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further incorporate the method of Mengel et al. as modified above with the coplanarity inspection of Paulsen et al., since one would be motivated to make such a modification to improve quality of the product and fix manufacturing problems (Abstract, lines 1-6) as implied from Paulsen et al.

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. as applied to claim 19 above, and further in view of Li (US Patent 6055328).

Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not specifically disclose comparing against templates.

Li teaches comparing against templates (col. 1, lines 30-35).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the

comparison of templates of Li, since one would be motivated to make such a modification to save time (col. 1, lines 30-35) as shown by Li.

10. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. as applied to claim 22 above, and further in view of Bilodeau et al. (US Patent 5465152).

Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not disclose calculating a best fit plane by least squares or planes of repose.

Bilodeau et al. teaches calculating a best fit plane by least squares (col. 3, lines 4-17) or planes of repose (col. 3, lines 24-36).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the calculations of Bilodeau et al., since one would be motivated to make such a modification to increase reliability of the inspection of chips for more reliable and robust connections (col. 1, lines 13-15, and col. 2, lines 5-10) as implied from Bilodeau et al.

11. Claims 25 and 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. as respectively applied to claim 17 above, and further in view of Roy et al. (US Patent 5956134).

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12. Regarding claims 25, 30, and 31, and for purposes of being concise, Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not disclose comparing a two dimensional image against a template and rejecting if the comparison reveals that the image does not include three dimensional features in an expected configuration exceeding a predetermined value.

Roy et al. teaches a two dimensional image against a template and rejecting if the comparison reveals that the image does not include three dimensional features in an expected configuration (col. 9, lines 44-50), which would necessarily exceed a predetermined value.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the template and rejecting of Roy et al., since one would be motivated to make such a modification to inspect semiconductor devices more efficiently and expeditiously (col. 2, lines 29-35) as implied from Roy et al.

13. Regarding claim 32, Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not specifically disclose inspecting coplanarity.

Paulsen et al. further teaches inspecting coplanarity (col. 6, lines 43-47).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further incorporate the method of Mengel et al. as modified above with the coplanarity inspection of Paulsen et al., since one would be motivated to make such a modification to improve quality of the product and fix manufacturing problems (Abstract, lines 1-6) as implied from Paulsen et al.

14. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al., Haugan et al., and Roy et al. as applied to claim 25 above, and further in view of Michael (US Patent 5640200).

Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not disclose a gray scale image correlated against a template.

Michael teaches a gray scale image correlated against a template (col. 12, lines 1-11).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the correlation of Michael, since one would be motivated to make such a modification to process inspection faster and more accurately (col. 12, lines 1-11) as implied from Michael.

15. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. as applied to claim 17 above, and further in view of Bartulovic et al. (US Patent 6177682).

Mengel et al. as modified above suggests a method as recited above. Mengel et al. further discloses a laser as a light source (Figure, #11).

However, Mengel et al. does not disclose a pair of opposed light sources to obtain first and second three dimensional data to combine to obtain a three dimensional image.

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Bartulovic et al. teaches a pair of opposed light sources (Fig. 5, #41' – 41''') to obtain first and second three dimensional data to combine to obtain a three dimensional image (col. 10, lines 54-57).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the opposed light sources for a three dimensional image of Bartulovic et al., since one would be motivated make such a modification to obtain a more precise image for analysis (col. 2, lines 38-46) as shown by Bartulovic et al.

16. Claims 28, 36, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al. and Haugan et al. as respectively applied to claim 17 above, and further in view of Michael et al. (US Patent 5978080).

17. Regarding claims 28 and 36, and for purposes of being concise, Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not disclose calibrating to a machined fixture.

Michael et al. teaches calibrating (Abstract) to a machined fixture (Abstract, "fiducial").

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the calibrating of Michael et al., since one would be motivated make such a modification to improve the machine vision system for correlation between physical coordinates and image pixels (col. 1, lines 28-30, and col. 2, line 1) as implied from Michael et al.

18. Regarding claim 37, Mengel et al. as modified above suggests the method as recited above. Mengel et al. further discloses determining a shape (page 2, line 31).

However, Mengel et al. does not disclose rejecting if a shape or any feature falls outside a predetermined boundary.

Paulsen et al. further teaches rejecting (col. 2, lines 55-57, and col. 3, lines 1-2) if a shape or a feature (col. 6, line 65) falls outside a predetermined boundary.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further incorporate the method of Mengel et al. as modified above with the rejecting of Paulsen et al., since one would be motivated to make such a modification to better monitor quality of parts produced (Abstract, lines 1-2) as implied from Paulsen et al.

19. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al., Haugan et al., and Michael et al. as applied to claim 28 above, and further in view of Williams (US Patent 4801207).

Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not disclose transforming to reduce geometric distortion.

Williams teaches transforming to reduce geometric distortion (col. 14, lines 30-45).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the transforming of Williams, since one would be motivated to make such a modification to reduce distortion (col. 14, lines 30-45) as implied from Williams for better images.

20. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al., Haugan et al., and Roy et al. as applied to claim 30 above, and further in view of Bartulovic et al.

Mengel et al. as modified above suggests a method as recited above. Mengel et al. further discloses a laser as a light source (Figure, #11).

However, Mengel et al. does not disclose a pair of opposed light sources to obtain first and second three dimensional data to combine to obtain a three dimensional image.

Bartulovic et al. teaches a pair of opposed light sources (Fig. 5, #41' – 41''') to obtain first and second three dimensional data to combine to obtain a three dimensional image (col. 10, lines 54-57).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the opposed light sources for a three dimensional image of Bartulovic et al., since one would be motivated make such a modification to obtain a more precise image for analysis (col. 2, lines 38-46) as shown by Bartulovic et al.

21. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al., Haugan et al., and Roy et al. as applied to claim 30 above, and further in view of Michael et al.

Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not disclose calibrating to a machined fixture.

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Michael et al. teaches calibrating (Abstract) to a machined fixture (Abstract, "fiducial").

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the calibrating of Michael et al., since one would be motivated make such a modification to improve the machine vision system for correlation between physical coordinates and image pixels (col. 1, lines 28-30, and col. 2, line 1) as implied from Michael et al.

22. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al., Haugan et al., Roy et al., and Michael et al. as applied to claim 34 above, and further in view of Williams.

Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not disclose transforming to reduce geometric distortion.

Williams teaches transforming to reduce geometric distortion (col. 14, lines 30-45).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the transforming of Williams, since one would be motivated to make such a modification to reduce distortion (col. 14, lines 30-45) as implied from Williams for better images.

23. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al., Haugan et al., and Michael et al. as applied to claim 37 above, and further in view of Roy et al.

Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not disclose comparing a two dimensional image against a template and rejecting if the comparison reveals that the image does not include three dimensional features in an expected configuration exceeding a predetermined value.

Roy et al. teaches a two dimensional image against a template and rejecting if the comparison reveals that the image does not include three dimensional features in an expected configuration (col. 9, lines 44-50), which would necessarily exceed a predetermined value.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the template and rejecting of Roy et al., since one would be motivated to make such a modification to inspect semiconductor devices more efficiently and expeditiously (col. 2, lines 29-35) as implied from Roy et al.

24. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al., Haugan et al., Michael et al., and Roy et al. as applied to claim 38 above, and further in view of Michael.

Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not disclose a gray scale image correlated against a template.

Michael teaches a gray scale image correlated against a template (col. 12, lines 1-11).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the

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correlation of Michael, since one would be motivated to make such a modification to process inspection faster and more accurately (col. 12, lines 1-11) as implied from Michael.

25. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al., Haugan et al., Michael et al., Roy et al., and Michael as applied to claim 39 above, and further in view of Bartulovic et al.

Mengel et al. as modified above suggests a method as recited above. Mengel et al. further discloses a laser as a light source (Figure, #11).

However, Mengel et al. does not disclose a pair of opposed light sources to obtain first and second three dimensional data to combine to obtain a three dimensional image.

Bartulovic et al. teaches a pair of opposed light sources (Fig. 5, #41' – 41''') to obtain first and second three dimensional data to combine to obtain a three dimensional image (col. 10, lines 54-57).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the opposed light sources for a three dimensional image of Bartulovic et al., since one would be motivated make such a modification to obtain a more precise image for analysis (col. 2, lines 38-46) as shown by Bartulovic et al.

26. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mengel et al. in view of Paulsen et al., Haugan et al., Michael et al., Roy et al., Michael, and Bartulovic et al. as applied to claim 40 above, and further in view of Williams.

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Mengel et al. as modified above suggests a method as recited above.

However, Mengel et al. does not disclose transforming to reduce geometric distortion.

Williams teaches transforming to reduce geometric distortion (col. 14, lines 30-45).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Mengel et al. as modified above with the transforming of Williams, since one would be motivated to make such a modification to reduce distortion (col. 14, lines 30-45) as implied from Williams for better images.

Response to Arguments

27. Applicant's arguments with respect to claims 17-41 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

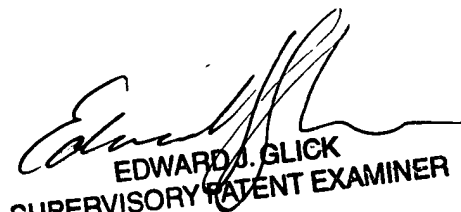
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



gk



EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER